

PATENT COOPERATION TREATY

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NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

GILL JENNINGS & EVERY
Broadgate House
7 Eldon Street
London EC2M 7LH
ROYAUME-UNI

Date of mailing (day/month/year)
27 January 2000 (27.01.00)

Applicant's or agent's file reference
RSJ05923WO

IMPORTANT NOTIFICATION

International application No.
PCT/GB99/01467

International filing date (day/month/year)
10 May 1999 (10.05.99)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

THE WELDING INSTITUTE
Abington Hall
Abington
Cambridge CB1 6AL
United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address

THE WELDING INSTITUTE
Granta Park
Great Abington
Cambridge CB1 6AL
United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Ellen Moyse

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

12 January 2000 (12.01.00)

International application No.

PCT/GB99/01467

Applicant's or agent's file reference

RSJ05923WO

International filing date (day/month/year)

10 May 1999 (10.05.99)

Priority date (day/month/year)

15 May 1998 (15.05.98)

Applicant

BURLING, Paul, Maurice

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

13 December 1999 (13.12.99)



in a notice effecting later election filed with the International Bureau on:

2. The election, ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

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Authorized officer

Jean-Marc Vivet

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference RSJ05923W0	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 99/01467	International filing date (day/month/year) 10/05/1999	(Earliest) Priority Date (day/month/year) 15/05/1998
Applicant THE WELDING INSTITUTE et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. _____

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01467

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C04B28/26 C04B14/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 015 626 A (J. KINGSBURY) 2 January 1962 (1962-01-02) column 3, line 1-10 column 5, line 13,14 column 6, line 48-54; claims 1,4 ---	1-4,6, 14-16, 18,22,23
X	DE 195 15 779 A (REINZ-DICHTUNGS GMBH) 31 October 1996 (1996-10-31) column 1, line 12-16 column 2, line 56-58 column 3, line 3,4 column 3, line 17-22; claim 8 ---	1-4,7,8, 14-16, 18,23
A	US 3 203 813 A (V. GAJARDO, ET AL.) 31 August 1965 (1965-08-31) claim 1 --- -/--	2,22

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 August 1999

Date of mailing of the international search report

01/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
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Authorized officer

Daeleman, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01467

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 42 31 838 C (SCHWAB-SVEDEX) 18 November 1993 (1993-11-18) claim 1 ----	5
A	FR 2 336 524 A (SHOWA VERMICULITE K K) 22 July 1977 (1977-07-22) claims 1,3,5,10 ----	1,4, 16-18
A	GB 693 168 A (G. CARPENTER) claim 1 ----	1,20,21
A	GB 627 532 A (J. BENNIE) claims 1,6,7 ----	1,8
A	GB 613 090 A (J. BENNIE) claims 1,4 ----	1,20,21
A	US 5 085 897 A (J. LUCKANUCK) 4 February 1992 (1992-02-04) column 1, line 28 - column 2, line 6 ----	1,9-11
A	DE 296 16 564 U (PAFAMAX BRANDSCHUTZTECHNIK) 19 December 1996 (1996-12-19) claims 6-8 ----	
A	WO 97 02414 A (MMM) 23 January 1997 (1997-01-23) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/01467

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3015626	A	02-01-1962	NONE	
DE 19515779	A	31-10-1996	WO 9634398 A	31-10-1996
US 3203813	A	31-08-1965	NONE	
DE 4231838	C	18-11-1993	EP 0589165 A	30-03-1994
FR 2336524	A	22-07-1977	JP 52081312 A	07-07-1977
			CA 1061089 A	28-08-1979
			CH 610972 A	15-05-1979
			DE 2656473 A	07-07-1977
			GB 1552387 A	12-09-1979
			IT 1060036 B	10-07-1982
			US 4078028 A	07-03-1978
			ZA 7605100 A	27-07-1977
GB 693168	A		NONE	
GB 627532	A		NONE	
GB 613090	A		NONE	
US 5085897	A	04-02-1992	NONE	
DE 29616564	U	19-12-1996	NONE	
WO 9702414	A	23-01-1997	US 5686039 A	11-11-1997
			AU 6174096 A	05-02-1997
			BR 9609649 A	02-03-1999
			CA 2225811 A	23-01-1997
			EP 0835368 A	15-04-1998

PATENT COOPERATION TREATY

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REC'D 18 SEP 2000

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RSJ05923WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/01467	International filing date (day/month/year) 10/05/1999	Priority date (day/month/year) 15/05/1998
International Patent Classification (IPC) or national classification and IPC C04B28/26		
Applicant THE WELDING INSTITUTE et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of four sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 13/12/1999	Date of completion of this report 13.09.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Vathilakis, S Telephone No. +49 89 2399 8585



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01467

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

Description, pages:

1,3-9 as originally filed

2 as received on 12/05/2000 with letter of 10/05/2000

Claims, No.:

1-24 as received on 12/05/2000 with letter of 10/05/2000

Drawings, sheets:

1/2,2/2 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01467

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-24
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-6
Industrial applicability (IA)	Yes:	Claims	1-24
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/01467

ITEM V:

Claim 1 is not considered to involve an inventive step in view of the document D1 (US 3015 628) seen alone, as well as combined with D3 (US 3 203 813) for the following reasons.

Claim 1 of the application is only new over the disclosure in example 2 in D1, in that the binder used there is of organic nature. The product there possesses properties (density, flexural strength and conductivity) comparative to the products described in the present application.

However D1 states that other binders such as inorganic materials (sodium silicate, bentonite clay, various cements etc.) are also suitable for the same purpose and would be selected depending on the temperature conditions in which the product is to be used, "including extreme temperatures... up to 1000°F and above"; cf. column 6, lines 54-58. This is regarded as an explicit reference to the possibility of use of ceramic binders in this document according to the circumstances.

Furthermore document D3, concerning insulating materials including high proportions of vermiculite (up to 90%, cf. claim 1), describes the use of ceramic binders (specific alkali metal silicates) due to their refractory nature up to about 1700°F and the formation of ceramic bonds through a thermo-chemical reaction in the material; cf. D3, col. 1, lines 42-46 and col. 6, l. 28-32. This is seen as a clear incentive to use ceramic binders.

Consequently, the skilled man starting from the teaching of D1, seen alone, which deals in the same field and is considered to represent the closest prior art, or in combination with D3 giving useful advises, would in case where application of the product at higher temperatures is desirable, replace without exerting inventive step the organic binder in example 2 with an inorganic (ceramic) one.

Based on this view, the argument of the Applicant that the fire test on page 8 of the application is an indication of inventive step is not convincing. The heat resistant property described there was to be expected for the skilled person, upon using ceramic binders and is not considered as surprising.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/01467

Analogous arguments apply mutatis-mutandis against inventive step of dependent claims 2-6.

ITEM VII:

The Applicant, with the aim to correct a typographical error, has replaced the value of density "730 Kg/m³" originally disclosed, with the value "130 Kg/m³". This constitutes an infringement of Art. 34 2) b) PCT.

Although it was immediately obvious for the reader that the initial value was too high and needed rectification, it was not clear what the correct value should be.

This view is based on the statements on page 2, lines 26-27 and 28, where is described that the density values of the claimed products should be > 140 Kg/m³, in particular between 240-300 Kg/m³. Therefore the reader would expect a value of over 140 for useful products. See also Rule 66.5 and the PCT-Guidelines VI-7.14.

We have found that a very cost effective product can be obtained by utilizing a mixture of vermiculite granules and a ceramic binder. This should be contrasted with known mica sheet and panels made using paper making or other processes which are very dense products. The new product will be much less dense than this sheet material with the result that heat insulation is promoted by virtue of the trapped air. Furthermore, the resultant product is very lightweight making it much easier to handle and can be utilized in a variety of forms depending upon the application.

We have realised that a problem with the known product is that it is made using ground or sieved particles which result in too high a density. This results in a reduction in voids which include trapped air and thus a reduction in the heat resistant performance of the product. On the other hand, if the particle size is too large then a product can result in which there is an open, air path from one side of the product to the other through which heat can be conducted. By utilising particles which fall within the inventive ranges, both these problems are overcome while at the same time a relatively light weight product is produced.

We have also found that the resultant product has good mechanical strength properties and for example with densities in the range $250-300\text{Kg/m}^3$, flexural strengths of $0.15-0.45\text{ MPa}$ are achieved. Experiments have shown that the density is preferably no less than 140Kg/m^3 to achieve acceptable flexural strength in a self-supporting product. Furthermore, the greater the proportion of the vermiculite, the more light weight the product. Thus, we have found that a product incorporating 95% dry weight vermiculite leads to a density of about 730Kg/m^3 while 35% dry weight vermiculite leads to a density of about 350Kg/m^3 .

Preferably, 50%-90% of the dry weight of the product is vermiculite having a particle size such that more than 60% of the vermiculite does not pass through a 1mm sieve.

CLAIMS**REPLACED BY
ART 34 AMDT**

1. A heat resistant product comprising a ceramic binder and vermiculite, wherein between 35% and 95% of the dry weight of the product is vermiculite having a particle size such that more than 60% of the vermiculite does not pass through a 1mm sieve.
2. A product according to claim 1, wherein 50%-95% of the dry weight of the product is vermiculite having a particle size such that more than 60% of the vermiculite does not pass through a 1mm sieve.
3. A product according to claim 1 or claim 2, wherein the product is substantially rigid.
4. A product according to any of the preceding claims, wherein the binder comprises the adhesive part of a two part binder.
5. A product according to any of claims 1 to 3, wherein the binder comprises the adhesive part of a two part binder, mixed with powdered vermiculite.
6. A product according to any of the preceding claims, further comprising glass fibre or other fibrous material reinforcement.
7. A product according to any of the preceding claims, wherein the vermiculite granules have a maximum dimension up to 15mm.
8. A product according to any of the preceding claims, wherein the product is sandwiched between load supporting sheets adhered to the product.
9. A product according to any of the preceding claims adhered onto the surface of an article.
10. A product according to any of claims 1 to 7 moulded onto the surface of an article.
11. A product according to any of claims 1 to 7 sprayed onto the surface of the article.
12. A product according to claim 10 or claim 11, wherein the article comprises a honeycomb structure.

REPLACED BY
ART 34 AMDT

11

13. A product according to claim 12, further comprising a phenolic glass laminate sandwiched between the honeycomb structure and the product.

14. A product according to any of the preceding claims,
5 wherein the vermiculite has a particle size such that more than 80% of the vermiculite does not pass through a 2mm sieve.

15. A fire wall comprising a heat resistant product according to any of the preceding claims.

10 16. A method of manufacturing a heat resistant product, the method comprising mixing vermiculite granules with a ceramic binder; and drying the mixture, wherein between 35% and 95% of the dry weight of the product is vermiculite having a particle size such that more than 60% of the
15 vermiculite does not pass through a 1mm sieve.

17. A method according to claim 16, wherein the drying step comprises heating the mixture, or vacuum drying the mixture.

18. A method according to claim 16 or claim 17, wherein
20 the mixture is held in a mould or press during the drying step.

19. A method according to claim 16 or claim 17, wherein the mixture is coated onto a surface of an article prior to the drying step.

25 20. A method according to any of claims 16 to 19, wherein the method is carried out in two steps, step 1 comprising coating the particles with a ceramic binder, and curing/drying the binder, and step 2 comprising coating the precoated particles with a ceramic binder, and
30 curing/drying the binder.

21. A method according to claim 20, when dependent on claim 18, wherein step 2 is carried out with the mixture held in a mould or press.

22. A method according to any of claims 16 to 21, wherein
35 50%-90% of the dry weight of the product is vermiculite having a particle size such that more than 60% of the vermiculite does not pass through a 1mm sieve.

23. A method according to any of claims 16 to 22, wherein the vermiculite has a particle size such that more than 80% of the vermiculite does not pass through a 2mm sieve.

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International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : C04B 28/26, 14/20</p>	<p>A1</p>	<p>(11) International Publication Number: WO 99/59935</p> <p>(43) International Publication Date: 25 November 1999 (25.11.99)</p>
<p>(21) International Application Number: PCT/GB99/01467</p> <p>(22) International Filing Date: 10 May 1999 (10.05.99)</p> <p>(30) Priority Data: 9810551.3 15 May 1998 (15.05.98) GB 9819753.6 10 September 1998 (10.09.98) GB</p> <p>(71) Applicant (for all designated States except US): THE WELD- ING INSTITUTE [GB/GB]; Abington Hall, Abington, Cam- bridge CB1 6AL (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): BURLING, Paul, Maurice [GB/GB]; 100 Woodland Road, Sawston, Cambridge CB2 4DU (GB).</p> <p>(74) Agent: GILL JENNINGS & EVERY; Broadgate House, 7 Eldon Street, London EC2M 7LH (GB).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>
<p>(54) Title: HEAT RESISTANT PRODUCT AND METHOD</p> <p>(57) Abstract</p> <p>A heat resistant product comprises a ceramic binder and vermiculite, wherein between 35 % and 95 % of the dry weight of the product is vermiculite having a particle size such that more than 60 % of the vermiculite does not pass through a 1 mm sieve.</p>		

FOR THE PURPOSES OF INFORMATION ONLY

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